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## ENGINEERING MATHEMATICS-2: (GATE 2022) - REPORTS

OVERALL ANALYSIS   COMPARISON REPORT   **SOLUTION REPORT**

ALL(17)   CORRECT(9)   INCORRECT(3)   SKIPPED(5)

Q. 1

[Solution Video](#)

[Have any Doubt ?](#)



A car manufacturing unit produces an average of 12 cars per hour. What is the probability that no car is manufactured in a particular 2 hr period?

A  $e^{-3}$

**B  $e^{-24}$**

Correct Option

**Solution :**

(b)

Let  $\alpha$  is rate of occurrence of event per unit time.

$\lambda$  = Average number of occurrences of event in specified observation period

$\lambda = \alpha \Delta t$

Here,  $\alpha = 12$  units/hr and  $\Delta t = 2$  hr

So,  $\lambda = 12 \times 2 = 24$

Now, far no car is manufactured in particular 2 hrs.

i.e.  $X = 0$

$$P(X=0) = \frac{e^{-\lambda} \lambda^0}{0!} = \frac{e^{-24} 24^0}{0!} = e^{-24}$$

C  $e^4$

D  $e^{12}$

[QUESTION ANALYTICS](#)



Q. 2

[Solution Video](#)

[Have any Doubt ?](#)



An unbiased coin is tossed 5 times, what is the probability of getting heads exactly 4 times?

A  $\frac{5}{12}$

B  $\frac{5}{4}$

**C  $\frac{5}{32}$**

Your answer is Correct

**Solution :**

(c)

Here binomial distribution can be used

$$P(H) = 0.5$$

Probability of getting head exactly 4 time.

$$\begin{aligned} P(X=4) &= {}^5C_4 (0.5)^4 (0.5)^1 \\ &= 5 \times (0.5)^5 \\ &= \frac{5}{32} \end{aligned}$$

D  $\frac{5}{16}$

[QUESTION ANALYTICS](#)



Q. 3

[FAQ](#)

[Solution Video](#)

[Have any Doubt ?](#)



If  $f(x) = \frac{2x^2 - 5x + 2}{5x^2 - 15x + 10}$  then what will be  $\lim_{x \rightarrow 2} f(x)$

A  $-\frac{1}{5}$

B  $\frac{3}{5}$

Your answer is Correct

Solution :  
(b)

Given,  $f(x) = \left( \frac{2x^2 - 5x + 2}{5x^2 - 15x + 10} \right) \left[ \frac{0}{0} \text{ form} \right]$

Using L Hospital's rule

$$\lim_{x \rightarrow 2} \left( \frac{4x - 5}{10x - 15} \right) = \frac{8 - 5}{20 - 15} = \frac{3}{5}$$

C  $\frac{13}{7}$

D  $\frac{20}{13}$

QUESTION ANALYTICS



Q. 4

Solution Video

Have any Doubt ?



A fair coin is tossed 5 times, what is the probability that only the first two tosses will yield heads?

A  $\left( \frac{1}{2} \right)^2$

B  ${}^5C_2 \left( \frac{1}{2} \right)^2$

C  $\left( \frac{1}{2} \right)^5$

Your answer is Correct

Solution :  
(c)

Only first two tosses are heads

So,  $P(H, H, T, T, T)$

And each toss is independent.

So, required probability

$$\begin{aligned} &= P(H) \times P(H) \times (P(T))^3 \\ &= \left( \frac{1}{2} \right)^2 \left( \frac{1}{2} \right)^3 = \left( \frac{1}{2} \right)^5 \end{aligned}$$

D  ${}^5C_2 \left( \frac{1}{2} \right)^5$

QUESTION ANALYTICS



Q. 5

Solution Video

Have any Doubt ?



The probability mass function of a random variable  $X$  is given as

$$P(X, a) = \begin{cases} a, & \text{if } X = 0 \\ 1 - a, & \text{if } X = 1 \\ 0, & \text{otherwise} \end{cases}$$

If  $a = 0.6$ , then variance of  $X$  is \_\_\_\_\_.

A 0

B 0.36

C 0.24

Correct Option

Solution :  
(c)

Given,  $a = 0.6$

\_\_\_\_\_

X	0	1
P(X)	0.6	0.4

$$\text{Required value} = V(X) = E(X^2) - [E(X)]^2$$

$$E(X) = \sum_i X_i P_i = 0 \times 0.6 + 1 \times 0.4 = 0.4$$

$$E(X^2) = \sum_i X_i^2 P_i = 0^2 \times 0.6 + 1^2 \times 0.4 = 0.4$$

$$\therefore V(X) = E(X^2) - [E(X)]^2 = 0.4 - 0.16 = 0.24$$

**D** 0.76

QUESTION ANALYTICS

Q. 6

[FAQ](#)

[Solution Video](#)

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What is the value of the following limit?

$$\lim_{x \rightarrow 0} \frac{d}{dx} \frac{\sin^2 x}{x}$$

**1**

Your answer is **Correct**

**Solution :**

1

$$\text{Find } \frac{d}{dx} \left( \frac{\sin^2 x}{x} \right)$$

$$= \frac{(\sin^2 x)' x - (x)' \sin^2 x}{x^2} = \frac{[2 \sin x \cdot \cos x] x - \sin^2 x}{x^2}$$

$$= \frac{x \sin 2x - \sin^2 x}{x^2}$$

$$\lim_{x \rightarrow 0} \left( \frac{x \sin 2x - \sin^2 x}{x^2} \right)$$

$$= \lim_{x \rightarrow 0} \left( \frac{x \sin 2x}{x^2} - \frac{\sin^2 x}{x^2} \right) = \lim_{x \rightarrow 0} \frac{x \sin 2x}{x^2} - \lim_{x \rightarrow 0} \left( \frac{\sin x}{x} \right)^2$$

$$= \lim_{x \rightarrow 0} \frac{\cos 2x \cdot 2}{1} - 1$$

$$= 2[\cos 2(0)] - 1$$

$$= 2(1) - 1 \Rightarrow 1$$

QUESTION ANALYTICS

Q. 7

[Solution Video](#)

[Have any Doubt ?](#)



Find the value of  $K$  so that function  $f$  defined below, is continuous at  $x = 0$

$$f(x) = \begin{cases} \frac{1 - \cos 4x}{8x^2}, & \text{if } x \neq 0 \\ k, & \text{if } x = 0 \end{cases}$$

**1**

Your answer is **Correct**

**Solution :**

1

Given function is continuous at  $x = 0$

$$\therefore (\text{LHL})_{x=0} = (\text{RHL})_{x=0} = f(0)$$

$$\text{Now, L.H.L} = \lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} \frac{1 - \cos 4x}{8x^2}$$

$$\text{Put, } x = 0 - h = -h \text{ when } x \rightarrow 0, h \rightarrow 0$$

$$\text{So, } \lim_{h \rightarrow 0} \frac{1 - \cos(-4h)}{8h^2}$$

$$\lim_{h \rightarrow 0} \frac{2 \sin^2 2h}{8h^2}$$

$$\lim_{h \rightarrow 0} \left( \frac{\sin 2h}{2h} \right)^2 = 1$$

$$\text{At, } x = 0, f(0) = K$$

$$\text{Also LHL} = f(0), \text{ therefore } K = 1$$

QUESTION ANALYTICS

Q. 8

[Solution Video](#)[Have any Doubt ?](#)

Which of the following statements are true?

**A** The dispersion measure characterises the extent to which data items differ from the central tendency value.

Your option is **Correct**

**B** The central tendency measure indicates the average value of data.

Correct Option

**C** Standard deviation is example of central tendency measure.

Your answer is **IN-CORRECT**

**D** Mean is example of central tendency measure.

Your option is **Correct**

YOUR ANSWER - a,c,d

CORRECT ANSWER - a,b,d

STATUS -

Solution :

(a, b, d)

- Standard deviation, variance and coefficient of variation are examples of dispersion measures.
- Mean, median and mode are some examples of central tendency measure.



QUESTION ANALYTICS



Q. 9

[Solution Video](#)[Have any Doubt ?](#)

Let  $P(E)$  denote the probability of event  $E$ . Given that  $P(A) = \frac{1}{4}$  then  $P(B) = \frac{1}{6}$  then which of the following is/are true? Given  $A$  and  $B$  are independent

**A**  $P(A \cap B)$  is  $\frac{1}{24}$

Your option is **Correct**

**B**  $P\left(\frac{A}{B}\right)$  is  $\frac{1}{6}$

**C**  $P\left(\frac{B}{A}\right)$  is  $\frac{1}{6}$

Your option is **Correct**

**D**  $P\left(\frac{A}{B}\right)$  is  $\frac{1}{4}$

Your option is **Correct**

YOUR ANSWER - a,c,d

CORRECT ANSWER - a,c,d

STATUS -

Solution :

(a, c, d)

$$P(A) = \frac{1}{4}, \quad P(B) = \frac{1}{6}$$

Both events are independent,

$$\text{So, } P(A \cap B) = P(A) \cdot P(B) = \frac{1}{4} \times \frac{1}{6} = \frac{1}{24}$$

$$P\left(\frac{A}{B}\right) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{1}{24}}{\frac{1}{6}} = \frac{6}{24} = \frac{1}{4}$$

$$P\left(\frac{B}{A}\right) = \frac{P(A \cap B)}{P(A)} = \frac{\frac{1}{24}}{\frac{1}{4}} = \frac{4}{24} = \frac{1}{6}$$



QUESTION ANALYTICS



Q. 10

[FAQ](#)[Solution Video](#)[Have any Doubt ?](#)

$f(x)$  is a polynomial function of second degree such that  $f(-4) = 8$ ,  $f(1) = 8$  and  $f(3) = 15$ . Find the point at which the graph of this function intersects a line drawn parallel to  $y$  axis through  $x = 2$ .

**A** (2, 8)

**B** (2, 10)

C (2, -11)

D (2, 11)

Correct Option

Solution :

(d)

Let,

$$f(x) = ax^2 + bx + c$$

$$f(-4) = 16a - 4b + c = 8$$

...(i)

$$f(1) = a + b + c = 8$$

...(ii)

$$f(3) = 9a + 3b + c = 15$$

...(iii)

On solving equation (i), (ii) and (iii) we get,

$$a = \frac{1}{2}, \quad b = \frac{3}{2}, \quad c = 6$$

So,

$$f(x) = \frac{x^2}{2} + \frac{3x}{2} + 6$$

Now value of  $f(x)$  at  $x = 2$

$$f(2) = \frac{4}{2} + 3 + 6 = 11 \text{ which leads to point } (2, 11)$$



QUESTION ANALYTICS

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Item 1-10 of 17

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